INSTALLATION CRITERIA
FOR
SWITCHABLE FM OSCILLATOR
MODEL GSO-1

Electronic Services Los Angele
M13804X

DATA-CONTROL SYSTEMS, INC.

DCS

INSTALLATION CRITERIA
FOR
SWITCHABLE FM OSCILLATOR
MODEL GSO-1

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Data-Control Systems, Inc.
Danbury, Connecticut

Frontispiece. Model GSO-1 Switchable FM Oscillator

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SECTION I
INTRODUCTION

1-1 GENERAL

1-2 PURPOSE. The purpose of this publication is to acquaint the user of the Switchable FM Oscillator, Model GSO-1, with the electrical and physical installation requirements for the unit.

1-3 SCOPE. This publication presents the function and description of the GSO-1; the physical characteristics, including dimensions, space requirements, and external cooling provisions required for installation of the unit. It presents the external power requirements including line power as well as cables and connectors.

SECTION II
DESCRIPTION

2-1 GENERAL

2-2. This section presents a brief outline of the function, description, and performance specifications of the GSO-1. Complete details may be found in the instruction manual.

2-3 FUNCTION

2-4. The Switchable FM Oscillator, Model GSO-1, used as a signal generator, provides an ultra linear FM signal source for use in calibrating FM demodulation equipment or for flexible simulation of FM equipment.

2-5 DESCRIPTION

2-6. The GSO-1 is a rugged transistorized FM oscillator maintaining exceptional signal stability over a wide range of frequencies (100 cycles to 700 kilocycles). The deviation sensitivity of the GSO-1 is adjustable in discrete steps. Deviation linearity and drift are comparable to those found in the most precise FM demodulation equipment. Deviation percentage may be selected by any of three standard settings or is continuously adjustable by means of potentiometers. Physically, the GSO-1 is interchangeable with other modular units in the new DCS line of solid state equipments. The GSO-1 mounts in one half of the DCS Modular Housing, Model GMH-3.

2-7 CHARACTERISTICS

2-8 CHANNEL SELECTION. 24-position front-panel switch covers range of settings from 220 cycles to 500 kilocycles.

Zero adjustment control selects any center frequency within this range.

2-9. ZERO SELECTION. Selectable by either front-panel control or stored zero for each of the 24 channels. Stored zero adjustable by screwdriver setting. Zero adjustment range is 1:1.6 (62.5 percent) of frequency.

2-10. LINEARITY. ±0.1 percent of bandwidth for deviation of ±15 percent and below. Within ±0.2 percent of bandwidth for deviations above ±15 percent and frequencies above 200 kilocycles.

2-11. INPUT SIGNAL. Either 0 to +5, 0 to -5, or ±2.5 volts for full bandwidth deviation with no switching required. (±2.5 volts input MUST be used for 40 percent deviation.)

2-12. DEVIATION SENSITIVITY. Front-panel selection of either ±7.5, 15, or 40 percent for 5 volts peak-to-peak input signal. Fourth position on switch permits incorporation of either fixed or adjustable resistance for other deviation settings (within limits of ±7.5, 15, and 40 percent).

Sensitivity fixed within ±1.0 percent of nominal value for 7.5 or 15 percent deviation and for all channels below 100 kilocycles.

Sensitivity fixed within ±2.0 percent of nominal value for 40 percent deviation and for all channels above 100 kilocycles.

2-13. INPUT IMPEDANCE. Nominal 100 K ohms shunted by 25 mmf.

2-14. DRIFT. Maximum drift of ±1.0 percent of bandwidth in 15 hours of operation after one hour warmup period.

2-15. OUTPUT. 5 volts (±10 percent) peak-to-peak or 30 ma peak-to-peak square wave standard output forms.

5 volts peak-to-peak to any one of 24 pins on output plug selected by channel selector switch to auxiliary filter unit.

2-16. COLOR. DCS gray (identical with USN Bu Ships LIGHT GRAY. Formula No. 111.-Class 2 Semi-gloss; MIL-E-15090B)

2-17. POWER REQUIREMENTS. 117 volts (±10 percent) 55 to 65 cps; approximately 20 watts.

SECTION III
INSTALLATION

3-1 GENERAL

3-2. This section describes the mounting, cooling, power requirements, and connections for the installation of the GSO-1.

3-3 MOUNTING

3-4. The GSO-1 FM Oscillator is designed to be rack mounted in a DCS Model GMH-3 Housing, which mounts two similar, mechanically-interchangeable DCS products side-by-side in a standard 19-inch relay rack. The GMH-3 housing occupies 3-1/2 inches of vertical panel space, 17-1/8 inches deep.

3-5. A standard RETMA enclosure is suited for mounting the GMH-3 housing. Figure 3-1 illustrates the manner in which a GMH-3 housing is mounted in such an enclosure. Internal vertical angle iron supports are supplied with the enclosure. On each side of the enclosure an aluminum angle support is mounted horizontally, parallel to the rack side panels, and fastened to the vertical angle iron supports. The housing slides in from the front of the enclosure and rests upon the aluminum angles. Two tabs are provided on the rear of the housing, and these should be fastened to the aluminum angles with screws. Two panel screws fasten the housing panel to the front of the enclosure.

3-6 COOLING

3-7. An adequate supply of cooling air must be provided to prevent damage to the germanium transistors and to maintain

TO BE

SUPPLIED

Figure 3-1. Installation of GSO-1.

functional stability. The moving air for cooling the GSO-1 should have an ambient temperature of less than 40°C. The GSO-1 should not be installed in an enclosure which contains electron tubes or other heat generating equipment which would cause the temperature to rise in excess of 40°C. Figure 3-2 shows the approved type of air flow. Rear heat sink temperature should be maintained at less than 60°C.

CAUTION

Excessive heating may impair the stability of the unit and component life.

3-8 POWER REQUIREMENTS

3-9. Power requirements for the GSO-1 are 105 to 125 volts at 55 to 65 cps. No external regulation is required if line voltage is maintained within these limits.

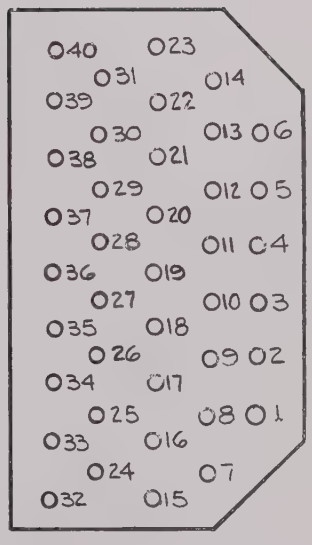
3-10 CONNECTIONS

3-11. The connectors at the rear of the GSO-1 (J303 and J302) are Cannon type DPX-40-34P and DPX-J16C3-34P respectively. Their mating connectors (DPX-40-33S and DPX-J16C-33S) are supplied with the unit. Before operating, the mating connectors should be wired according to the tables on the GSO-1 outline drawing (DO-008136).

3-12. Tables 3-1 and 3-2 describe the input and output power connector terminals and the connections for normal use.

Table 3-1. Cable Connections J303

PIN	CONNECTION
	VCO Output Switch Position
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	Ground
26	VCO Output Direct
27	NC
28	NC
29	NC
30	Ground
31	NC
32	NC
33	NC
34	NC
35	NC
36	NC
37	NC
38	NC
39	117 VAC from GSO-1 Power Switch*
40	117 VAC from GSO-1 Power Switch*

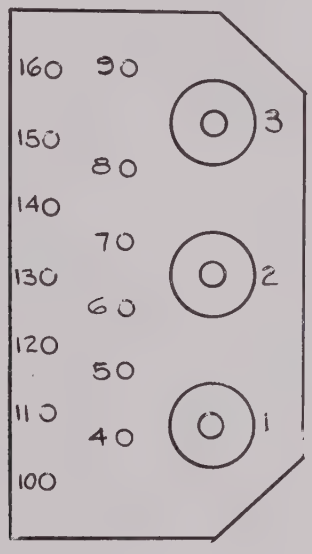


CANNON CONNECTOR DPX-40-34P
MATING CONNECTOR DPX-40-33S
SUPPLIED

*To Auxiliary Equipment

Table 3-2. Cable Connections J302

Cannon Connector DPX-J16C3-34P and Mating Connector DPX-J16C3-33S supplied.



PIN	CONNECTION
1	VCO Input
2	VCO Output
3	NC
4	GND
5	NC
6	NC
7	NC
8	NC
9	GND
10	NC
11	NC
12	NC
13	NC
14	NC
15	117 VAC
16	117 VAC

SECTION IV
OPERATION

4-1 GENERAL

4-2. This section includes a brief description of the operation of the GSO-1. Figure 4-1 shows the location of the controls and indicators. Detailed operating instructions will be found in the instruction manual.

4-3 OPERATING PROCEDURE

4-4. Power is applied to the unit by setting the POWER toggle switch on the right side of the panel to the up position. POWER indicator above the switch will light red. Conformance to drift specifications requires a one-hour warmup period. Adjustment may start, however, after approximately five minutes.

4-5 INITIAL CHECKOUT

4-6. Full operating procedures will be found in the instruction manual. The following initial installation test permits checkout of the functional operation of the GSO-1.

4-7. Connect the OUT jacks on the right side of the panel to a frequency counter in parallel with the vertical plates of an oscilloscope. The oscilloscope will show the waveform of the signal (carrier only) and the frequency counter will show the frequency of the signal. Next, apply a suitable modulation voltage to the IN jack (+5 volts, -5 volts, or ±2-1/2 volts) and set the DEVIATION % knob to 7.5, 15, and 40 respectively. The signal in the output should deviate accordingly. At the left side of the panel, set the ZERO SELECT toggle switch to the up position and turn the ZERO

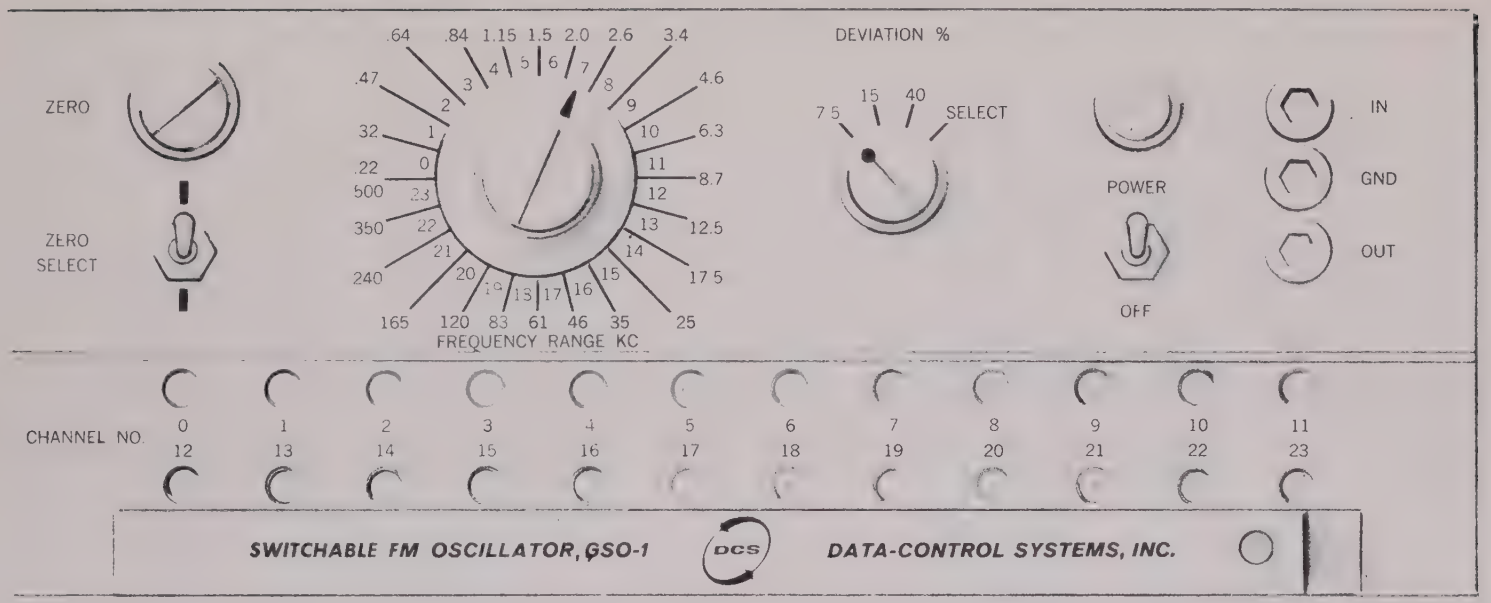


Figure 4-1. Controls and Indicators

knob from one extreme to the other. This should vary the waveform of the output signal. Set the ZERO SELECT toggle switch to the down position and insert a screwdriver in the CHANNEL NO. hole whose number corresponds to the setting of the FREQUENCY RANGE KC selector switch. Varying the screwdriver adjustment from one extreme to the other (10 turns) should have the same effect on the output signal as turning the ZERO knob in the previous step. Disconnect the input and output devices and turn off the unit by setting the POWER toggle switch to the OFF (down) position.

4-8. The above checkout procedure tells merely whether the unit is operating. Detailed instructions for the operation and service of the GSO-1 will be found in the instruction manual.

APPENDIX A

DRAWINGS AND SCHEMATICS

DATA-CONTROL SYSTEMS INC.
EAST LIBERTY STREET
DANBURY, CONNECTICUT

SUBJECT: Switchable FM Test Oscillator

MODEL: GSO-1

FUNCTION

The Switchable FM Test Oscillator, Model GSO-1, provides a high quality FM signal source for use in checking FM demodulation equipment for flexible simulation of FM systems.

DESCRIPTION

The GSO-1 is a completely transistorized unit whose frequency can be adjusted over a very wide range. The deviation sensitivity of the unit is adjustable in discrete steps. The deviation linearity and zero drift are comparable to those found in the best FM demodulation equipment. Physically, the unit is interchangeable with the other modular units in the new D.C.S. solid state ground equipment.

PERFORMANCE SPECIFICATIONS

Channel Selection	- 24-position front panel switch covers range of settings from 220 cycles to 500 kc. Zero adjustment control selects any center frequency within this range.
Zero Selection	- Selected by either front panel control or stored zero for each of the 24 channels. Stored zero adjusted by screwdriver setting.
Linearity	- ±0.1% of bandwidth for deviation of ±15% and below. Within ±0.2% of bandwidth for deviations above ±15%, frequencies above 200 kc, and 0 to 5 volts input.
Input Signal	- Either 0 to +5, 0 to -5, or ±2.5 volts for full bandwidth deviation with no switching required. (±2.5 volts input must be used for 40% deviation.)
Deviation Sensitivity	- Front panel selection of either ±7.5%, ±15%, or 40% for 5 volts peak-to-peak input signal. Fourth position on switch permits incorporation of either fixed or adjustable resistance for other deviation settings within limits of ±7.5% and ±40%.
Input Impedance	- Nominal 100 K ohms shunted by 25 mmf.
Drift	- Maximum drift of ±1.0% of bandwidth in 15 hours operation after one hour warm-up period.

Output	-	a. 5 volts (±10%) peak-to-peak or 30 ma peak-to-peak square wave standard output forms. b. 5 volts peak-to-peak to any one of 24 pins on output plug selected by channel selector switch to auxilary filter unit.
Modulation Index	-	Standard index of 1.0 up to 250 kc. Maximum index of 2.0 at 500 kc.

INSTALLATION and DIMENSIONAL SPECIFICATIONS

Power Requirements	-	117 volt A.C. (±10%), 55-65 cps. Minimum 30 watts.
Dimensions	-	8.12" wide x 3.22" high x 19.38" long
Weight	-	14 pounds (Shipping weight: 19 pounds)
Mounting	-	Mounts in one-half of a Model GMH-3 Modular Housing
Cooling	-	None required if operated below 40°C ambient temperature
Connectors	-	Cannon connectors DPX-J16C3-34P and DPX-40-34P. Mating connectors DPX-J16C3-33S and DPX-40-33S supplied. Pin connections listed DCS drawing DO-008136.
Controls and Indicators	-	"Frequency Range" selector; "Zero" adjust; "Zero Select"; "Deviation" selector; "Power" switch; "Power" light; monitors "In", "Out", and "GND", 24 zero adjustment potentiometers.
Color	-	Light Gray per MIL-E-15090B; Silkscreening is black and red.

ORDERING INFORMATION

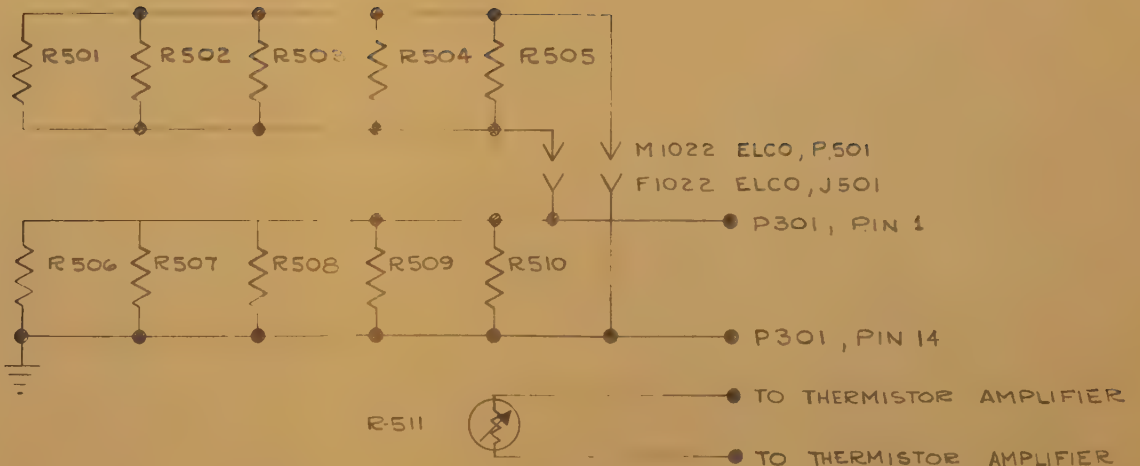
To order, please specify: DCS Model GSO-1 Switchable FM Test Oscillator

FOR COMPLETE INFORMATION ON THE DCS LINE OF REASEARCH DATE ACQUISITION AND TEST EQUIPMENT, CONTACT THE OFFICE WHICH SERVES YOUR AREA OR WRITE DATA-CONTROL SYSTEMS, INC., DANBURY, CONNECTICUT

REV.	DATE	DESCRIPTION	BY

BW-008694 C/3

ITEM	SYMBOL	DWG. NO.	DESCRIPTION	QTY/ASSY



NOTES:

1. R501 TO R510 ARE HEATER ELEMENTS HOTWATT INC. .125 DIA. X 2.00 LONG 40 Ω
2. R511 IS KEYSTONE CARBON CO. THERMISTOR # RL 25E1

REF.	DESCRIPTION	QTY

G50-11C	R	~
PRODUCT	NEXT ASSEMBLY	QTY/ASSY

DATA CONTROL SYSTEMS, INC.

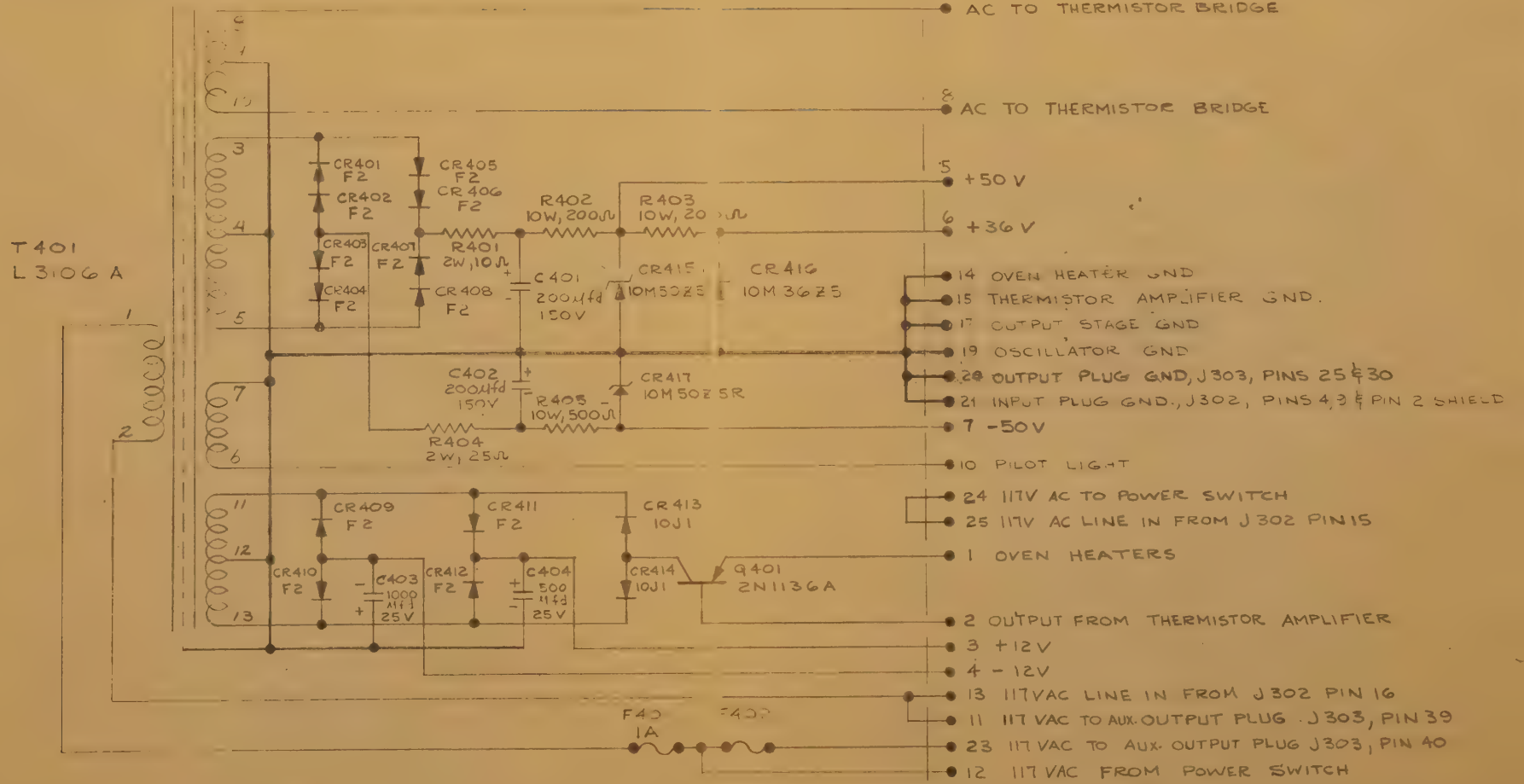
TITLE: SCHEMATIC, OVEN HEATERS

TOLERANCES: UNLESS OTHERWISE SPECIFIED			
DECIMAL - 3 PLACE ± .005	DWN. RRF	DATE 1/12/67	DO NOT SCALE DRAWING
DECIMAL - 2 PLACE ± .010	CHKD.	2-20-67	MAT'L
FRAC. ± 1/64 ANG. ± 0°30'	PROJ. ENG.	2-20-67	FINISH
FLATNESS WITHIN ~ /IN.	CH ENG.	3/1/67	REV
FRACTIONAL HOLES -0, + 1/64	SCALE ~		BW-008694 D4
NOTE: BREAK ALL SHARP CORNERS .005"-.015"			

REV.	DATE	DESCRIPTION	BY	CK	APP'D
1	4-3-61	CA-161-INTERCHG. POS OF C402 & C417	RAF		

BW-008696 REV 01

ITEM	SYMBOL	DWG NO.	DESCRIPTION	QTY / ASSY



NOTES

1. ALL RESISTORS ±10% W.W.
2. ALL RECTIFIERS SARKES TARZIAN
3. ALL ZENER DIODES MOTOROLA 10% SERIES

REF	DESCRIPTION	QTY

G50-1/S	REF	~
PRODUCT	NEXT ASSEMBLY	QTY / ASSY

DATA CONTROL SYSTEMS, INC.

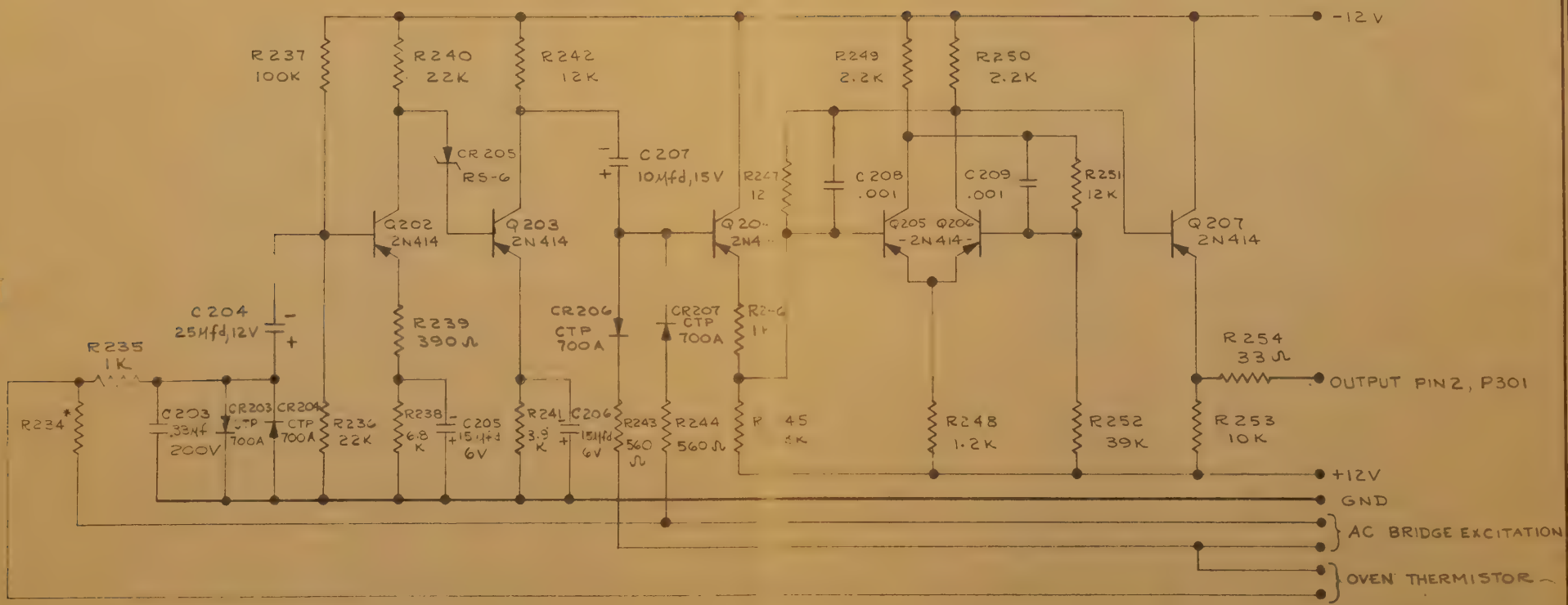
TITLE: SCHEMATIC, POWER SUPPLY

TOLERANCES UNLESS OTHERWISE SPECIFIED		DATE	DO NOT SCALE DRAWING
DECIMAL - 3 PLACE ± .005	DWN	1/10/61	
DECIMAL - 2 PLACE ± .010	CHKD	2-20-61	MAT'L
FRAC. ± 1/64 ANG. ± 0°30'	PROJ. ENG.	2-20-61	
FLATNESS WITHIN ~ /IN.	CH. ENG.	3/7/61	FINISH
FRACTIONAL HOLES -0, + 1/64	SCALE		
NOTE: BREAK ALL SHARP CORNERS .005"-.015"			BW-008696 REV. 01

REV.	DATE	DESCRIPTION	BY	CHK'D	APP'D
01	5-11-61	CA-161 REPOSITIONED R235 & C203	WF		

BW-008693 REV 01

ITEM	SYMBOL	DWG NO.	DESCRIPTION	QTY ASSY



NOTE:

1. ALL RESISTORS ±10% ½W EXCEPT *FACTORY ADJUST

* = FACTORY ADJUST
½W, 1% (TEMPERATURE ADJUST)

REF	DESCRIPTION	QTY

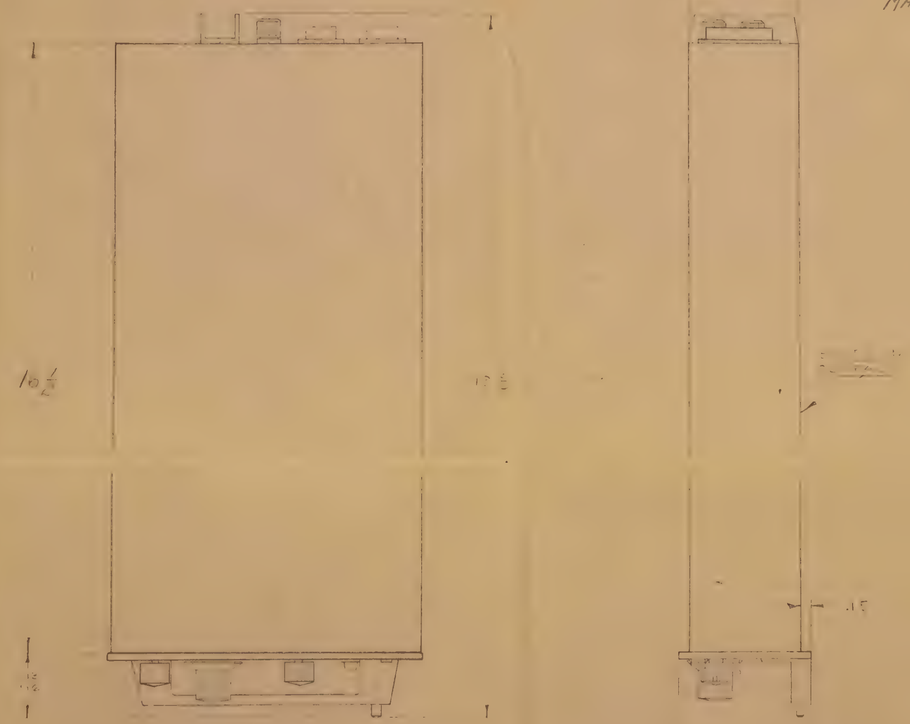
GSO-1/C	R	~
PRODUCT	NEXT ASSEMBLY	QTY/ASSY

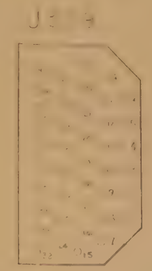
DATA CONTROL SYSTEMS, INC.

TITLE: SCHEMATIC - THERMISTOR AMPLIFIER

TOLERANCES: UNLESS OTHERWISE SPECIFIED		DATE	DO NOT SCALE DRAWING
DECIMAL - 3 PLACE ± .005	DWN. RR 7	1-12-60	
DECIMAL - 2 PLACE ± .010	CHKD [illegible]	2-20-61	MAT'L
FRAC. ± 1/64 ANG. ± 0°30'	PROJ ENG. [illegible]	2-20-61	
FLATNESS WITHIN ___ /IN.	CH ENG. [illegible]	3/9/61	FINISH
FRACTIONAL HOLES -0, + 1/64	SCALE ___		
NOTE: BREAK ALL SHARP CORNERS .005"-.015"			BW-008693 REV. 01

REV	DATE	DESCRIPTION	BY	CK
03	10/66	ADDED CHASSIS #11		
04	4/67	ADDED SOCKET & RELAY		

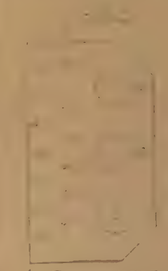




CANNON CONNECTOR DPX-40-34P
MATING CONNECTOR DPX-40-33S
SUPPLIED

PIN	CONNECTION
1	V30 OUT FROM J1 SWITCH POS. 0
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
25	GROUND
26	
27	
28	
29	
30	
31	
32	
33	
34	

117 VAC FROM GS OUTPUT J1 - SWITCH
117 VAC FROM GS PWR CORD
} TO AUXILIARY



CANNON CONNECTOR DPX-[illegible]
MATING CONNECTOR - DPX-[illegible]
SUPPLIED

PIN	CONNECTION
1	VCO IN - J7
2	VCO OUT

- CANNON DPX-J 803-34P
- CANNON DPX-40-34P

VIEW FROM REAR OF UNIT

NOTES:
1. UNIT TO SLIDE INTO RACK MOUNT HOUSING MODEL GVC-2

REF	DESCRIPTION	QTY

330-1		1
PINOUT	NEXT ASSEMBLY	

DATA CONTROL SYSTEMS, INC.

TOLERANCES UNLESS OTHERWISE SPECIFIED:
DECIMAL 1 PLACE ± .005
DECIMAL 2 PLACE ± .010
FRAC ± 1/64 ANG ± 0°30'
FLATNESS WITHIN .001 IN
FRACTIONAL HOLES +.0 -.1/64
NOTE: BREAK ALL SHARP CORNERS .005

	DATE
DWN	
CHK'D	
PR. ENG.	
QA	
PROJ. ENG.	

TITLE OUTLINE-330-1

DO NOT SCALE DRAWING

MAT'L

FINISH

SIZE D

D5-00330-10

NO.	DATE	DESCRIPTION	BY	CHK	APP
02	3/24	CA-88 - CORRECTED TERMINATION OF R118 TO -6 SOURCE INSTEAD OF GND	EKK	MY	RD
08	5-3-61	CA-161 INVERTED C201 & R201 OF 1/3 & R124 - TERMINATED R124 TO GND	RKK	MY	MY

DW-008851 03

R107 82.5K 1%
R111 6.34K 1%
R115 6.34K 1%
R119 619Ω 1%
R121 8.25K 1%
R122 11K 1%
R308 1.5K, 1% P3
-50V
Q110 2N414
Q111 2N338
CR112 CTP 700A
CR111 CTP 700A
S401
S303A
R301
R308 R309 R310 R311 R312 R313 R314 R315 R316 R317 R318 R319 R320 R321 R322 R323 R324 R325 R326 R327 R328 R329 R330 R331
CR107 CTP 700A
R109 CTP 700A
Q109 2N414
CR108 CTP 700A
CR110 CTP 700A
Q108 2N414
R209
R210 R211 R212 R213 R214 R215 R216 R217 R218 R219 R220 R221 R222 R223 R224 R225 R226 R227 R228 R229 R230 R231 R232 R233
Q116 SYL 2118
R125 4K, 1% P3
Q115 2N414
C102 .01 1144
C103 .01MFD
CR103 IN763
CR104 IN764
Q104 SYL 2118
R107 SYL 2118
C101 .05
S4G
S202A
Q102 2N1440
Q103 2N1440
Q105 SYL 2118
R102 1M 1%
R101 2.37K 1%
102 1% F305 5K
R104 14.7K 1%
R105 3.92K 1%
R106 4.75K 1%
R108 475K 1%
R109 12K 1%
R110 10K 1%
R112 10K 1%
R113 1M 1%
R114 47.5K 1%
R118 5.62K 1% 1/3
R120 11K 1%
R123 82K
R201 15K
C201 75V 1.4fd
CR113 CTP 700A
R124* 1% P3
S202B
ALL TO J303
PIN 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
PIN 24, J303
PIN 2, J302
+36V
GND
C301 200V 1% .435MF
C302 200V 1% .237MF
C303 200V 1% .612MF
C304 200V 1% .150MF
C305 200V 1% .118MF
C306 200V 1% .0656MF
C307 200V 1% .0501MF
C308 200V 1% .0326 MF
C309 100V 1% .0154 MF
C310 100V 1% .7520 MF
C311 100V 1% 3.135MF
C312 100V 1% 2.110MF
C313 100V 1% 1.100MF
C314 100V 1% .544 MF
C315 100V 1% 251 MF
C316 100V 1% 251 MF
R116 5.62K 1%
R303* R304* R117 5.2K 1% K306 10K
R202 2.2K
CR201 CTP 700A
R203 R204 Ω
CR202 CTP 700A
R204 6.8K
R205 2.2K, 2W
R206 3K
R207 100Ω
Q201 2N601
C202 50MFD 12V
+50V
INPUT, PIN 1, J302
INPUT GND (SHIELD)

NOTE
1. R307 THRU R331 ARE 10 TURN, 10K POTENTIOMETERS
2. R309 THRU R232 ARE ¼W, 1% 15K RESISTORS
* FACTORY ADJUST
3. THIS DRAWING FOR FIRST RUN UNITS SERIAL # 051 TO 064

AUG 17 1961

DATA CONTROL SYSTEMS, INC.

TITLE SCHEMATIC GSD-1/C

TOLERANCES UNLESS OTHERWISE SPECIFIED: DECIMAL 2 PLACE ± .010, DECIMAL 3 PLACE ± .005, FRAC ± 1/64 AND ± 0°30', FLATNESS WITHIN .001, FRACTIONAL HOLES NO. 4-104, NOTE: BREAK ALL SHARP CORNERS .005-.015

DRN [illegible] DATE 7/61
CHKD [illegible] 2-28-61
PROJ ENGR [illegible] 2-28-61
CHF ENGR [illegible] 8/7/61
SCALE 4

DO NOT SCALE DRAWING

GSD-1/C REF
PRODUCT NEXT ASSEMBLY

DW-008851 REV 03